

**CLAIMS**

I claim:

- 1     1.     A fuel filter assembly for an internal combustion engine comprising:
  - 2             a filter housing formed of first and second housing segments,
  - 3             said housing segments defining a filter chamber,
  - 4             a filter positioned in said filter chamber between said housing segments,
  - 5             said first housing segment having an inlet port,
  - 6             said second housing segment having an outlet port,
  - 7             a valve seat mounted to said first housing segment in fluid communication with
  - 8     said inlet port,
  - 9             a valve in said valve housing and movable into and out of engagement with said
  - 10    valve seat,
  - 11            a valve stem extending through said fuel port,
  - 12            a valve actuator in said filter chamber connected to said valve stem and extending
  - 13    toward engagement with said filter,
  - 14            said valve actuator configured to move said valve into closed relationship with
  - 15    said valve seat and block the spillage of fuel from said fuel filter assembly in response to
  - 16    said filter being removed from said filter chamber,
  - 17            said valve actuator being sized and shaped to open said valve away from said
  - 18    valve seat in response to said filter being placed in said filter chamber.

1        2.        The fuel filter assembly of claim 1, wherein  
2                said filter is disc shaped with a perimeter rim and filter material inside said rim,  
3                said valve actuator configured to engage the filter at said rim, and  
4                said inlet port, said outlet port, said filter, and said valve being axially aligned.

1        3.        The fuel filter assembly of claim 1, wherein  
2                said filter is circular-shaped and has a circular perimeter rim, and said valve actuator is  
3                configured to engage said filter at said rim.

1        4.        The fuel filter assembly of claim 1, wherein  
2                said first and second housing segments are formed with mounting flanges that are  
3                sized and shaped to telescopically fit together,  
4                a seal positioned between said mounting flanges,  
5                the length of said telescopic fit being greater than the movement of said valve  
6                toward and away from the valve seat,  
7                so that the valve engages the valve seat before the mounting flanges separate  
8                when disconnecting the first and second housing segments from each other to limit the  
9                volume of liquid escaping from the fuel filter assembly.

1        5.        The fuel filter of claim 1, wherein  
2                said filter is positioned normal to the path of fuel through said fuel chamber, and  
3                said valve housing includes an axial inlet connection and a radial inlet connection,  
4                said axial inlet connection configured to introduce fuel to said inlet port in a direction

5 parallel to said path of fuel through said chamber, and  
6 said radial inlet connection configured to introduce fuel to said inlet port in a  
7 direction normal to said path of fuel through said chamber.

1 6. The fuel filter assembly of claim 5, wherein  
2 said first housing segment is shaped to be connected to said second housing segment  
3 at different positions whereby said radial inlet connection can be oriented at different  
4 angles about said housing.

1 7. A fuel filter assembly for an internal combustion engine comprising:  
2 a housing formed of first and second housing segments,  
3 said housing segments defining a filter chamber,  
4 a filter positioned in said filter chamber between said housing segments,  
5 said first housing segment having an inlet port in communication with said filter  
6 chamber,  
7 said second housing segment having an outlet port in communication with said  
8 filter chamber,  
9 a valve seat in fluid communication with said inlet port,  
10 a valve movable into and out of engagement with said valve seat to open and  
11 close the flow of fuel through the housing,  
12 said inlet port, said filter, said outlet port and said valve seat being  
13 axially aligned with one another,  
14 a valve actuator extending between said valve and said filter,

15           said valve actuator configured to move said valve into closed relationship with  
16           said valve seat and block the spillage of fuel from said fuel filter assembly in response to  
17           said filter being removed from said filter chamber, and  
18           said valve actuator being sized and shaped to open said valve away from said  
19           valve seat in response to said filter being placed in said filter chamber.

1       8.     The fuel filter assembly of claim 7, wherein  
2           said filter has a perimeter rim, and  
3           said valve actuator has a plurality of filter engagement legs configured to engage  
4           said filter at said perimeter rim.

1       9.     The fuel filter assembly of claim 7, wherein  
2           said filter has a perimeter rim, and said valve actuator is configured to engage said filter  
3           at said perimeter rim.

1       10.    The fuel filter assembly of claim 7, wherein  
2           said first and second housing segments are formed with mounting flanges that are  
3           sized and shaped to telescopically fit together,  
4           a seal positioned between said mounting flanges,  
5           the length of said telescopic fit about said seal being greater than the movement of  
6           said valve toward and away from the valve seat,

7           so that the valve engages the valve seat before the mounting flanges separate  
8       when disconnecting the first and second housing segments from each other to limit the  
9       volume of liquid escaping from the fuel filter assembly.

1       11.     The fuel filter of claim 7, wherein  
2           said filter is positioned normal to the path of fuel through said fuel chamber, and  
3           said valve housing includes an axial inlet connection configured to introduce fuel to  
4       said inlet port in a direction parallel to said path of fuel through said chamber, and a  
5       radial inlet connection configured to introduce fuel to said inlet port in a direction normal  
6       to said path of fuel through said chamber.

1       12.     The fuel filter assembly of claim 11, wherein  
2           said first housing segment is shaped to be connected to said second housing segment  
3       at different positions whereby said radial inlet conduit can be oriented at different angles  
4       about said housing.

1       13.     A method of disassembling a liquid filter assembly, having a segmented housing,  
2           said segmented housing including a liquid supply segment including valve seat  
3       and a valve movable toward and away from the valve seat to open and close the flow of  
4       liquid through said liquid supply segment, and a sealing flange,  
5           a delivery segment having a sealing flange telescopically engaging said sealing  
6       flange of said supply segment,

7           a sealing ring between said sealing flange of the supply segment and the sealing  
8 flange of said delivery segment,  
9           and a filter supported between said supply segment and said delivery segment,  
10          a valve actuator for engagement with the valve and engagement with the filter to  
11 maintain the valve in an open position in response to the filter being present in said  
12 segmented housing closed about the filter,  
13          the method comprising the steps of:  
14          progressively opening the segmented housing by telescopically moving the supply  
15 segment away from the delivery segment and progressively closing the valve against the  
16 valve seat,  
17          as the supply segment moves away from the delivery segment, continuously  
18 maintaining the seal between the sealing flanges until the valve is closed against the valve  
19 seat to limit the loss of liquid from the filter assembly.

1    14.    A method of opening a segmented fuel filter assembly of an internal combustion  
2 engine, comprising:  
3          pulling the segments apart;  
4          blocking the flow of fuel through the assembly in response to pulling the segments from  
5 each other before the segments are separated from each other.